Addressing Intensity Frontier Experiments Needs

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Simulation for Intensity Frontier

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Areas of Focus

- Support related to Geant4/GENIE usage
- Geant4/GENIE validation
- Geant4/GENIE Development and Development Assistance
- Other

Support related to Geant4/GENIE usage

- Consultancy on best practices and advice on new features (All?) – being done

  (Everybody is invited to attend Geant4 Technical Fora)

- Consultancy related to migration to newer versions of Geant4 (All?) – being done

- Support of migration from various neutrino generator tools and Geant3 or FLUGG to GENIE and Geant4 (MnB, M, M+) – can consult

Support related to Geant4/GENIE usage cont'd

- Consultancy regarding Geant4 geometry (including validation and overlap checks) (NvA, LBNE, Mu2e, All?) – usually very experiment specific; being done; needs more effort?
- Consultancy regarding Geant4 visualization tools (NvA, LBNE, Mu2e, All?) – being done; needs more effort?
- Consultancy on Geant4 handling of step size, magnetic field parameters, handling of secondary particles. (NvA) – usually very experiment specific; can consult

Support related to Geant4/GENIE usage cont'd

- Help with tau and charm decays in Geant4 (NvA)
  - can consult
- artG4Tk – developing/supporting an art Geant4 interface and prototyping/validation tool
  - in progress

Geant4/GENIE validation

- Validation of Geant4 physics lists for beam and detector simulation with special emphasis on physics related to protons striking various target materials) (All?)
  - For neutrino and muon production and neutrino interactions and muon stopping/capture processes
  - For processes generating electron backgrounds (Mu2e)

– Developing and validating new physics lists and Geant4 physics in partnership with experiments

Geant4/GENIE validation cont'd

- Development and support of GENIE validation/tools (All neutrino experiments?)
  - under development
- Validation of G4 physics for LiAr (LBNE, McB)
  - being planned

Geant4/GENIE Development and Development Assistance

- Customized physics lists for simulation of beam-target interactions and detectors (including neutrino ones) (M, M+, NvA, Mu2e, g-2, All?) – being done in partnership with experiments
- Implementation of new processes related to Dark Matter production on target (MnB) and interaction of Dark Matter with the detector in GENIE (MnB) – partner?
- NUANCE and GENIE comparison, implementation of the same file format (MnB) – partner?
- Make (flux and detector response) predictions within an uncertainty band derived from known uncertainties in physics model parameters (MvA) – working with the Geant4 Collaboration to enable the functionality

Other

- Package FLUKA and G4NuMI as UPS products (NvA)
- More resources for NuMi-X simulation (NvA)
- Cosmogenic simulation and validation (LBNE), photon propagation lookup library (LBNE)

  – Domain of specific experiments or no PDS Group domain